

Phytochemical analysis of different solvent extracts of *Ipomoea pes-caprae* L.

Christhu Uthayam M¹, P.Vijayarengan²

Department of Botany

^{1,2} Annamalai University, Annamalai nagar-608002

Abstract- *Ipomoea pes-caprae* (Convolvulaceae) is a valuable medicinal plant, distributed in the tropics and subtropics regions, and it is usually known as railroad vine and goat's-foot morning glory. The juice from the succulent leaves has been used as a first aid to treat jellyfish stings and also used in ritual baths to alleviate evil spells. The extract of the leaves have the astringent, diuretic and laxative properties. Leaves are used in rheumatism, and as stomachic and tonic. It has wide range of pharmacological activities antioxidant, analgesic, anti-inflammatory, antispasmodic, anti-nociceptive, antihistaminic, hypoglycemic activities. The present investigation is carried out in *Ipomoea pes-caprae* plants collected from Samiyarpettai, Chidambaram, Cuddalore district, Tamil nadu. The different plant parts such as root, stem and leaf were extracted using different solvents like petroleum ether, chloroform, ethyl acetate and methanol. The qualitative phytochemical analysis of the plants confirm the presence of various phytochemicals like alkaloids, flavonoids, tannins, saponins, terpenoids and steroids.

Keywords- *Ipomoea pes-caprae*, plant parts, phytochemical, ethno-medicine.

I. INTRODUCTION

Ipomoea pes-caprae is a valuable medicinal plant, distributed in the tropics and subtropics regions. It is also known as bayhops, railroad vine, goat's-foot morning glory and beach morning glory. It grows on the upper parts of beaches and endures salted air. It is one of the most common and most widely distributed salt tolerant plants and provides one of the best known examples of oceanic dispersal. Its seeds float and are unaffected by salt water. Phytochemical screening of *I. pes-caprae* extracts has also revealed the presence of pharmacologically active components. Methanol extracts from leaves contain saponins and tannin (Gajir et al., 2013). The aqueous methanol extract of the aerial part contains steroids, terpenoids, alkaloids, flavonoids (De souzo et al., 2000) and exceptionally, high phenolic compounds (Banerjee et al., 2008). Both leaves and stem ethanol extracts contain alkaloids, saponins, tannins, anthraquinones and flavonoids (Venkataraman et al., 2013). Phytochemicals are secondary metabolites, which exhibit protective or disease preventive properties (Murugan et al., 2013). Terpenoids and

alkaloids exhibit hypoglycemic activities; steroids and triterpenoids as analgesics; saponins as antioxidant and anti-inflammatory; and flavonoids show anti-allergic, anti-inflammatory, antimicrobial and anticancer activities (Wani et al., 2012). The phenolics such as flavonoids, phenolic acids and tannins, exhibit largely antioxidative property and diverse biological activities in plant (Li et al., 2009). Herbal remedies are still being used extensively in many countries. Therefore, research on biologically active extracts and compounds from natural sources has been of great interest to scientists in an attempt to discover new sources for drugs that may be useful in combating infectious diseases. The aim of the present study was made to find out the phytochemical constituents of the root, stem and leaves of an important medicinal plant, *Ipomoea pes-caprae* with different solvents extracts like petroleum ether, chloroform, ethyl acetate and methanol.

II. COLLECTION OF PLANT MATERIAL

Ipomoea pes-caprae (root, stem and leaf) were collected from Samiyarpettai, Chidambaram, (Latitude 11°39'67 N; Longitude 79°71'15 E) Cuddalore district, Tamilnadu, India during month of July, 2016. The collected root, stem and leaves of *Ipomoea pes-caprae* were washed with tap water, then surface sterilized with 10 per cent sodium hypochlorite solution, raised with sterile distilled water and allowed to shade dried under room temperature. The samples were ground into fine powder using an electric blender.

III. PREPARATION OF EXTRACT

One hundred grams of each powdered plant material was successively extracted with petroleum ether, chloroform, ethyl acetate and methanol by using Soxhlet apparatus for 8 hours (Vogel et al., 1978). The extracts were filtered, pooled and the solvents were evaporated with the help of rotary evaporator (Heidolph, Germany) under reduced pressure at 40°C and the crude extracts were kept at 4°C in refrigerator for antimicrobial assay.

A. PHYTOCHEMICAL ANALYSIS

The different extracts of *Ipomoea pes-caprae* were used for qualitative phytochemical studies like alkaloids,

cardiac glycosides, terpenoids, steroids, flavonoids, phenolic compounds, tannins and saponins (Harborne et al., 1973; Trease et al., 1989).

IV.RESULTS

A. PHYTOCHEMICAL SCREENING OF CRUDE EXTRACTS

Phytochemical screening of petroleum ether, chloroform, ethyl acetate and methanol extracts of root, stem and leaves of *Ipomoea pes-caprae* were analysed and the results are presented in Tables 1 to 3. The root of *Ipomoea pes-caprae* showed the phytochemicals such as alkaloids, cardiac glycosides, terpenoids, steroids, flavonoids, phenolic compounds, tannins and saponins. Methanol extracts exhibited the phytochemicals such as alkaloids, cardiac glycosides, steroids, phenolic compounds, tannins and saponins. In the ethyl acetate extracts showed terpenoids, phenolic compounds and tannins. Terpenoids and saponins were present in the chloroform extract. Alkaloids, cardiac glycosides, terpenoids, steroids, phenolic compounds, tannins and saponins were absent and there was flavonoid in petroleum ether extracts of root.

The petroleum ether, chloroform, ethyl acetate and methanol extracts of stem of *Ipomoea pes-caprae* showed moderate phytochemicals. Among the extracts, the methanol extracts contained more content of alkaloids, terpenoids, flavonoids and phenolic compounds and moderate content of steroids, tannins and saponins. All the tested phytochemicals were present moderately except steroids in ethyl acetate extracts. In chloroform extracts, the phytochemicals like terpenoids, flavonoids, phenolic compounds and saponins were present. The fewer content of phytochemicals such as steroids, flavonoids, phenolic compounds, tannins and saponins were present in petroleum ether except alkaloids, cardiac glycosides, and terpenoids.

In leaf, the methanol extracts contained more content of alkaloids, terpenoids, steroids, flavonoids, phenolic compounds, tannins and saponins and there was no cardiac glycoside. The ethyl acetate extracts showed moderate phytochemicals such as alkaloids, cardiac glycosides, steroid, flavonoids, phenolic compounds, tannins and saponins except terpenoids. The alkaloids, terpenoids, steroids, tannins and saponins were present in chloroform extracts. The phytochemicals like alkaloids, phenolic compounds, tannins and saponins were present in petroleum ether extracts. There was no cardiac glycoside, flavonoids and phenolic compounds in chloroform extracts. Flavonoids, steroids, terpenoids and

cardiac glycosides were absent in petroleum ether extracts of leaves.

Table 1. Preliminary phytochemical analysis of different extracts of root of *Ipomoea pes-caprae*

| S. No. | Phyto-constituents | Petroleum ether | Chloroform | Ethyl acetate | Methanol |
|--------|--------------------|-----------------|------------|---------------|----------|
| 1 | Alkaloids | - | - | - | + |
| 2 | Cardiac glycosides | - | - | - | + |
| 3 | Terpenoids | - | + | + | - |
| 4 | Steroids | - | - | - | + |
| 5 | Flavonoids | + | - | - | - |
| 6 | Phenolic compounds | - | - | + | + |
| 7 | Tannins | - | - | + | + |
| 8 | Saponins | - | + | - | + |

(+) = Positive (present); (-) = Negative (absent); (++) = More strong

Table2. Preliminary phytochemical analysis of different extracts of *Ipomoea pes-caprae* stem

| S. No. | Phyto-constituents | Petroleum ether | Chloroform | Ethyl acetate | Methanol |
|--------|--------------------|-----------------|------------|---------------|----------|
| 1 | Alkaloids | - | - | + | ++ |
| 2 | Cardiac glycosides | - | - | + | - |
| 3 | Terpenoids | - | + | + | ++ |
| 4 | Steroids | + | - | - | + |
| 5 | Flavonoids | + | + | + | ++ |
| 6 | Phenolic compounds | + | + | + | ++ |
| 7 | Tannins | + | - | + | + |
| 8 | Saponins | + | + | + | + |

(+) = Positive (present); (-) = Negative (absent); (++) = More strong

Table3. Preliminary phytochemical analysis of different extracts of *Ipomoea pes-caprae* leaves

| S. No. | Phyto-constituents | Petroleum ether | Chloroform | Ethyl acetate | Methanol |
|--------|--------------------|-----------------|------------|---------------|----------|
| 1 | Alkaloids | + | + | + | ++ |
| 2 | Cardiac glycosides | - | - | + | - |
| 3 | Terpenoids | - | + | - | ++ |
| 4 | Steroids | - | + | + | ++ |
| 5 | Flavonoids | - | - | + | ++ |
| 6 | Phenolic compounds | + | - | + | ++ |
| 7 | Tannins | + | + | + | ++ |
| 8 | Saponins | + | + | + | ++ |

(+) = Positive (present); (-) = Negative (absent); (++) = More strong

V.DISCUSSION

In the present study, phytochemical activities of petroleum ether, chloroform, ethyl acetate and methanol extracts of root, stem and leaves of *Ipomoea pes-caprae* were analysed and the results showed that leaves extracts exhibited the strong phytochemicals than stem and root extracts. Among the extracts, methanol extracts showed more strong phytochemicals. *Ipomoea pes-caprae* leaves showed more content of alkaloids, terpenoids, steroids, flavonoids, phenolic compounds, tannins and saponins when compared to other parts of the plant. Methanol extracts of leaves contained more strong phytochemicals, alkaloids, flavonoids, phenolic compounds, terpenoids, steroids, saponins and tannins. Our results showed the presence of phytochemicals might be useful for medicinal purpose.

Phytochemicals are organic substances and could be obtained in both primary and secondary metabolic process,

they also provide a source of medicine since the earliest time. The plant kingdom has proven to be the most useful in the treatment of diseases and they provide an important source of all the world's pharmaceuticals. The most important of these bioactive constituents of plants are steroids, terpenoids, carotenoids, flavonoids, alkaloids, tannins and glycosides. (Edeoga et al., 2005). These findings are in agreement with the results in *I. pes-caprae* and they recorded the more amounts of phyto-constituents like alkaloids, phenols, steroids, tannins and flavonoids in leaf and stem. Nagababu and Umamaheswara Rao (2015) observed similar trend with different results in phytochemicals contents of *Ipomoea pes-caprae* whole plant i.e., results revealed the presence of a wide range of phytochemical constituents including alkaloids, glycosides, saponins, flavonoids, tannins, steroids, terpenoids, carbohydrates and soluble starch.

VI.CONCLUSION

Phytochemical activities of petroleum ether, chloroform, ethyl acetate and methanol extracts of root, stem and leaves of *Ipomoea pes-caprae* were analysed and the results showed that leaves extracts exhibited the strong phytochemicals than stem and root extracts. Among the extracts, methanol extracts showed more strong phytochemicals. *Ipomoea pes-caprae* leaves showed more content of alkaloids, terpenoids, steroids, flavonoids, phenolic compounds, tannins and saponins when compared to other parts of the plant. Methanol extracts of leaves contained more strong phytochemicals, alkaloids, flavonoids, phenolic compounds, terpenoids, steroids, saponins and tannins than the other solvents. These results show that this plant, which grows abundantly in the locality, has the potential to treat different kinds of ailments.

REFERENCES

- [1] Banerjee, D., Chakrabarti, S., Hazra, A. K., Banerjee, S., Ray, J., & Mukherjee, B 2008. Antioxidant activity and total phenolics of some mangroves in Sundarbans. *African J. Biotech.*, 7(6):805-810.
- [2] De Souza, M. M., Madeira, A., Berti, C., Krogh, R., Yunes, R.A., & Cechinel-Filho, V 2000. Antinociceptive properties of the methanolic extract obtained from *Ipomoea pes-caprae* (L.) R. Br. *J. Ethnopharma.*, 69(1): 85-90.
- [3] Edeoga.H.O, D.E.Okwu and B.O.Mbebie 2005. Phytochemical constituents of some Nigerian medicinal plants. *African J. Biotech.*, 7:685-688.
- [4] Ganjir, M., Behera, D. R., & Bhatnagar, S 2013. Phytochemical analysis, cytotoxic and antioxidant potential of *Ipomoea pes caprae* (L) R.Br and *Merremia umbellata* (L.) H. Hallier. *Inter. J. Sci.Tech. Res.*, 2(5): 80-83.
- [5] Harborne, J.B 1993. Methods of plant analysis. In: *Phytochemical Methods*. Chapman and Hall, London. pp: 74-79.
- [6] Li, H., Wang, X., Li, Y., Li, P., and Wang, H 2009. Polyphenolic compounds and antioxidant properties of selected China wines. *Food Chemistry*, 112: 454-46.
- [7] Murugan, T., Albino Wins, J., and Murugan, M 2013. Antimicrobial activity and phytochemical constituents of leaf extracts of *Cassia auriculata*. *Indian J. Pharm. Sci.*, 75(1): 122-125.
- [8] Nagababu P. and Umamaheswara Rao V 2015. Pharmacological potential of *Ipomea pes-caprae* (L.) R. Br. Whole plant extracts *Pelagia Research Library Der Pharmacia Sinica*, 6(2): 52-60.
- [9] Trease, G.E and W.C. Evans, 1989. *Pharmacognosy* 2nd Edn. Braille Tiridel and sMacmillan Publishers. pp: 242-245.
- [10] Venkataraman, N. D., Atlee, W. C., Prabhu, T. P., Surya, G., Kannan, R., and Nasar, I.S., 2013. Evaluation of in-vitro anti-arthritis potential of aerial parts of *Ipomoea pes-caprae* (L.) R. Br and establishment of its mechanism of action. *Res. J. Pharm. Biol. Chem. Sci.*, 4(2): 1560-1565.
- [11] Vogel, 1978. *Textbook of practical organic chemistry*. The English Language Book Society and Longman, London, 1368.
- [12] Wani, M., Sarvar, F.A., Agrawal, J., Deshpande, J., Mathew, S., and Khetmalas, M 2012. Qualitative phytochemical analysis and antimicrobial activity studies of *Gymnema sylvestre* R. Br. *Acta Biol. Indica.*, 1(1): 121-124.